1. (Currently Amended) A method for identifying impairments in a digitally modulated signal comprising ~~the steps of~~:

obtaining soft decision data derived from the digitally modulated signal;

applying a plurality of predefined impairment masks to the soft decision data, each impairment mask is a set of undesired values associated with the digitally modulated signal and is associated with a different impairment type;

determining a subset of the soft decision data that occur within each predefined impairment mask;

calculating a correlation weight based on each subset; and

based on the correlation weights, determining a likelihood that a particular impairment type is affecting the digitally modulated signal.

2. (Presently amended) The method of claim 1 further comprising ~~the steps of~~:

normalizing the soft decision data.

3. (Presently amended) The method of claim 2 wherein the impairment masks are selected from a group consisting of:

a phase noise impairment mask;

a continuous wave noise impairment mask;

a signal reflection impairment mask;

an I/Q imbalance impairment mask;

a compression impairment mask;

an amplitude-modulation-to-phase-modulation impairment mask; and

a composite phase noise and continuous wave noise impairment mask.

4. (Presently amended) The method of claim 2 further comprising ~~the step of:~~

providing a three-dimensional presentation of a distribution of the soft decision data over time.

5. (Presently amended) The method of claim 1 further comprising ~~the step of~~:

providing information descriptive of a distribution of occurrences of soft decision data within specific regions of the impairment masks.

6. (Canceled)

7. (Presently amended) A method for detecting impairment of a digital signal comprising ~~the steps of~~:

calculating a first correlation weight for a first predefined symbol-level impairment mask wherein the first predefined symbol-level impairment mask is a first set of undesired values associated with the digital signal;~~:~~

storing the first correlation weight;

calculating a second correlation weight for a first predefined constellation-level impairment mask, the first predefined constellation-level impairment mask

operative to detect a different impairment type than the first predefined symbol-level impairment mask and wherein the first predefined constellation-level impairment mask is a second set of undesired values associated with the digital signal;

storing the second correlation weight; and

calculating an overall correlation weight based on the first correlation weight and the second correlation weight.

8. (Presently amended) The method of claim 7 further comprising ~~the steps of~~:

calculating a third correlation weight for a second predefined symbol-level impairment mask wherein the second predefined symbol-level impairment mask is a third set of undesired values associated with the digital signal;

storing the third correlation weight;

calculating a fourth correlation weight for a second predefined constellation-level impairment mask wherein the second predefined constellation-level impairment mask is a fourth set of undesired values associated with the digital signal; and

storing the fourth correlation weight; wherein the ~~step of~~ calculating the overall correlation weight based on the first correlation weight and the second correlation weight further includes ~~the step of~~ calculating the overall correlation weight based on the first correlation weight, the second correlation weight, the third correlation weight, and the fourth correlation weight.

9. (Presently amended) The method of claim 8 further comprising ~~the step of~~:

measuring a quality of the digital signal.

10. (Presently amended) The method of claim 9 wherein the ~~step of~~ measuring ~~a~~ the quality of the digital signal further comprises ~~the step of~~:

checking a signal-to-noise ratio.

11. (Presently amended) The method of claim 7 wherein the first predefined symbol-level impairment mask is selected from a symbol-level impairment mask group consisting of:

a phase noise impairment mask;

a continuous wave noise impairment mask;

a composite phase noise and continuous wave noise impairment mask; and

a signal reflection impairment mask;

and wherein the first predefined constellation-level impairment mask is selected from a constellation-level impairment ~~trade~~ mask group consisting of:

an I/Q imbalance impairment mask;

a compression impairment mask; and

an amplitude-modulation-to-phase-modulation impairment mask.

12. (Presently amended) A digital receiving apparatus comprising:

a receiver responsive to a digitally modulated signal to perform conversion of the digitally modulated signal to soft decision data; ~~and~~

an impairment correlator operatively coupled to the receiver and responsive to the soft decision data to correlate a plurality of different types of impairments of the digitally modulated signal by using a plurality of predefined impairment masks wherein each impairment mask is a set of undesired values associated with the digitally modulated signal; and

a system controller operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator to determine a likelihood that a particular impairment type is affecting the digitally modulated signal.

13. (Previously presented) The digital receiving apparatus of claim 12 further comprising:

a memory device operatively coupled to the impairment correlator to store ~~a~~ the plurality of impairment masks ~~associated with the plurality of different types of impairments~~.

14. (Original) The digital receiving apparatus of claim 13 further comprising:

an error vector magnitude mask subsystem operatively coupled to the receiver and responsive to the soft decision data to assess a quality of the soft decision data.

15. (Original) The digital receiving apparatus of claim 14 wherein the error vector magnitude mask subsystem further comprises:

a SNR analyzer operatively coupled to the receiver and responsive to the soft decision data; and

an error vector magnitude mask memory device operatively coupled to the SNR analyzer to provide an error vector magnitude mask to the SNR analyzer.

16. (Presently amended) The digital receiving apparatus of claim 13 wherein the ~~further comprising a~~ system controller ~~operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator and to effect control of~~ controls the digital receiving apparatus in response to the correlation weight.

17. (Presently amended) The digital receiving apparatus of claim 13 wherein the ~~further comprising a~~ system controller ~~operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator and to effect control of~~ controls a transmitter in response to the correlation weight, the transmitter operatively coupled to the receiver to provide the digitally modulated signal to the receiver.

18. (Presently amended) The digital receiving apparatus of claim 13 wherein the ~~further comprising a~~ system controller ~~operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator and to effect control of~~ controls a medium in response to the correlation weight, the medium

operatively coupled to the receiver to convey the digitally modulated signal to the receiver.

19. (Presently amended) A cable modem comprising:

a cable modem receiver responsive to a downstream signal to perform conversion of the downstream signal to soft decision data; ~~and~~

an impairment correlator operatively coupled to the cable modem receiver and responsive to the soft decision data to correlate a plurality of different types of impairments of the downstream signal by using a plurality of predefined impairment masks wherein each impairment mask is a set of undesired values associated with the downstream signal; and

a system controller operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator to determine a likelihood that a particular impairment type is affecting the downstream signal.

20. (Previously presented) The cable modem of claim 19 further comprising:

a memory device operatively coupled to the impairment correlator to store ~~a~~ the plurality of impairment masks ~~associated with the plurality of different types of impairments~~.

21. (Original) The cable modem of claim 20 further comprising:

a cable modem transmitter operatively coupled to the impairment correlator to transmit a correlation weight from the impairment correlator to a cable modem termination system.

22. (Original) The cable modem of claim 20 further comprising:

an error vector magnitude mask subsystem operatively coupled to the cable modem receiver and responsive to the soft decision data to assess a quality of the soft decision data.

23. (Original) The cable modem of claim 22 wherein the error vector magnitude mask subsystem further comprises:

a SNR analyzer operatively coupled to the cable modem receiver and responsive to the soft decision data; and

an error vector magnitude mask memory device operatively coupled to the SNR analyzer to provide an error vector magnitude mask to the SNR analyzer.

24. (Presently amended) A cable modem termination system comprising:

a cable modem termination system receiver responsive to an upstream signal to perform conversion of the upstream signal to soft decision data; ~~and~~

an impairment correlator operatively coupled to the cable modem termination system receiver and responsive to correlate a plurality of different types of impairments of the upstream signal by using a plurality of predefined impairment masks

wherein each impairment mask is a set of undesired values associated with the upstream signal; and

a system controller operatively coupled to the impairment correlator to receive a correlation weight from the impairment correlator to determine a likelihood that a particular impairment type is affecting the upstream signal.

25. (Previously presented) The cable modem termination system of claim 24 further comprising:

a memory device operatively coupled to the impairment correlator to store a the plurality of impairment masks ~~associated with the plurality of different types of impairments~~.

26. (Original) The cable modem of claim 25 further comprising:

a network management system operatively coupled to the impairment correlator to provide a corrective control signal to a cable modem transmitting the upstream signal.

27. (Original) The cable modem termination system of claim 25 further comprising:

an error vector magnitude mask subsystem operatively coupled to the cable modem termination system receiver and responsive to the soft decision data to assess a quality of the soft decision data.

28. (Original) The cable modem of claim 27 wherein the error vector magnitude mask subsystem further comprises:

a SNR analyzer operatively coupled to the cable modem termination system receiver and responsive to the soft decision data; and

an error vector magnitude mask memory device operatively coupled to the SNR analyzer to provide an error vector magnitude mask to the SNR analyzer.

29. (Presently amended) A data structure ~~program storage device~~ readable by a machine, ~~tangibly~~ embodying a program of instructions executable by the machine to perform a method ~~steps~~ for identifying impairment of a digitally modulated signal received by the machine, the method ~~steps~~ comprising:

applying a plurality of predefined impairment masks to soft decision data received from the digitally modulated signal, each impairment mask is a set of undesired values associated with the digitally modulated signal and is associated with a different impairment type;

determining a subset of the soft decision data that occur within each predefined impairment mask;

calculating a correlation weight based on each subset; and

based on the correlation weights, determining a likelihood that a particular impairment type is affecting the digitally modulated signal.

30. (Presently amended) The data structure ~~program storage device~~ of claim 29 wherein the method ~~steps~~ further comprises ~~comprise~~:

normalizing the soft decision data.

31. (Previously presented) The data structure ~~program storage device~~ of claim 30 wherein the impairment masks are selected from a group consisting of:

a phase noise impairment mask;

a continuous wave noise impairment mask;

a signal reflection impairment mask;

an I/Q imbalance impairment mask;

a compression impairment mask;

an amplitude-modulation-to-phase-modulation impairment mask; and

a composite phase noise and continuous wave noise impairment mask.

32. (Presently amended) The data structure ~~program storage device~~ of claim 29 wherein the method ~~steps~~ further ~~comprise~~ comprises:

providing a three-dimensional presentation of a distribution of the soft decision data over time.

33. (Presently amended) The data structure ~~program storage device~~ of claim 29 wherein the method ~~steps~~ further comprises ~~comprise~~:

providing information descriptive of a distribution of occurrences of soft decision data within specific regions of the impairment masks.

34. (Canceled)

35. (Presently amended) A method for identifying a type of impairment in a system communicating a digitally modulated signal comprising ~~the steps of~~:

obtaining soft decision data derived from the digitally modulated signal;

performing ratio analysis on the soft decision data with respect to a predefined reference point; and

reporting a likelihood that a plurality of types of impairments corresponding to the ratio analysis are affecting the digitally modulated signal.

36. (Original) The method of claim 35 further comprising the step of:

providing a three-dimensional presentation of a distribution of the soft decision data over time.

37. (Canceled)

38. (Presently amended) A data structure ~~program storage device~~ readable by a machine, ~~tangibly~~ embodying a program of instructions executable by the machine to perform a method ~~steps~~ for identifying impairment of a digitally modulated signal received by the machine, the method ~~steps~~ comprising:

deriving soft decision data derived from the digitally modulated signal;

performing ratio analysis on the soft decision data derived from the digitally modulated signal with respect to a predefined reference point; and

reporting a likelihood that a plurality of types of impairments corresponding to the ratio analysis are affecting the digitally modulated signal.

39. (Original) The data structure ~~program storage device~~ of claim 38 wherein the method ~~steps~~ further comprises ~~comprise~~:

providing a three-dimensional presentation of a distribution of the soft decision data over time.

40-46. (Cancelled)